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A STUDY OF OBTURATOR ARTERY IN HUMAN CADAVER

Anatomy

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ABSTRACT

Obturator artery is usually a branch of anterior trunk of internal iliac artery. High frequency of variations in its origin and course has drawn attention of pelvic surgeons, anatomists and radiologists. The present study was conducted on thirty adult cadavers in the department of Anatomy, Indira Gandhi Institute of Medical Science,Patna,Bihar. The pelvis was divided into right and left halves, labelled and carefully dissected to study the origin, relations and length of Obturator artery within the pelvis. The findings were observed and recorded. Origin of obturator artery was from the anterior trunk of internal iliac in forty two sides (70%) and was variable in eighteen sides (30%). Obturator nerve was found lying below the artery in four sides (6.34%). The length of the artery varied between 4 and 10 cm. The variations in obturator artery may lead to surgical complications during pelvic surgeries requiring suturing along the pelvic brim. The anomalies affecting the arterial patterns of the limbs are based on unusual selection of channels from primary capillaries. The most appropriate channel enlarges, whilst the others retract and disappear, thereby establishing the final arterial pattern and resulting in variations in the origin.

KEYWORDS

Obturator artery; Origin; Relation; Variations.

Introduction

The presence of organs and other anatomical structures within the closely packed confines of the pelvis makes the study of the vascular patterns and their variations of much importance [1]. The rapid development of surgical and investigatory techniques and expertise, especially in cases involving obstetric procedures or urogenital interventions, makes it essential to understand the vascular tree in the abdomen especially in the pelvis [2].

The obturator artery normally arises from the anterior trunk of internal iliac artery. In about 13-30%, the obturator artery has an anomalous origin. The origin may be either from external iliac or inferior epigastric [3].

Normally, artery inclines anteroinferiorly on the lateral pelvic wall to the upper part of obturator foramen. In the pelvis, it is related laterally to obturator fascia separating it from obturator internus and is crossed medially by the ureter and the ductus deference separating it from parietal peritoneum, having the obturator nerve above and the obturator vein below [4]. Obturator artery when arises from the inferior epigastric artery, if lies at the medial side of the ring, alongside the edge of the lacunar ligament, it is vulnerable to injury or division if the ligament has to be incised to release a strangulated femoral hernia [5].

Materials and Methods

The study was conducted on sixty adult pelvic halves belonging to thirty embalmed cadavers of known sex in the department of Anatomy, indira Gandhi institute of medical science patna biharThe pelvis was divided into two equal halves by cutting through the pubic symphysis and the sacrum and coccyx. The section divided the bladder through internal urethral orifice, then passed either through uterus and vaginor between the two deferent ducts and then divided the rectum longitudinally.

Thus the two halves of adult pelvis were separated [6].

These two halves i.e right (R) and left (L) were numbered 1-30 male (M) and female (F). The pelvis was carefully dissected to see the origin,

Normal origin from anterior trunk (%)	Variable origin from (%)			
42 sides (70%)	Posterior trunk	Internal iliac	Inferior epigastric	External iliac
	6(10%)	2(3.33%)	4(6.67%)	2(3.33%)

Table 1: Mode of origin of the obturator artery.

course, length and relationship of obturator artery and observation were recorded to study the morphology of artery as well as its variation.

The length of the obturator artery from its origin to the point where it entered the obturator canal was measured by a non stretchable thread placed along its course. The thread was marked by Indian ink at its origin and at the point where it entered the obturator canal. The length was recorded in mm.

Result

The observations regarding the mode of origin of obturator artery are given in table 1. In 42 sides (70%), it arose from anterior trunk of internal iliac artery while variation in its origin was observed in 18 sides (30%).

The obturator artery which arose from anterior trunk (70%) was observed to pass anteroinferiorly on the lateral pelvic wall to the upper part of obturator foramen in the pelvis. It was related laterally to obturator fascia separating it from obturator internus having the obturator nerve above and the obturator vein below (Figure 1). In 2 sides (3.33%), it arose as a common trunk with vaginal and internal

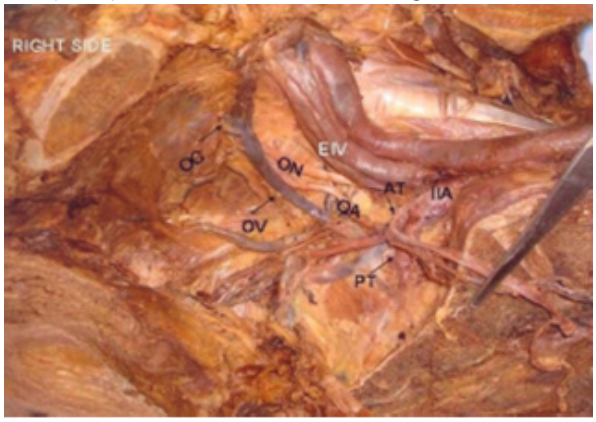

Figure 1: Showing the origin of right obturator artery (OA) from anterior trunk (AT) of internal iliac artery (IIA) with obturator nerve (ON) lying above and obturator vein (OV) below the artery , (PT- Posterior trunk, EIV-External iliac vessels, OC-obturator canal).

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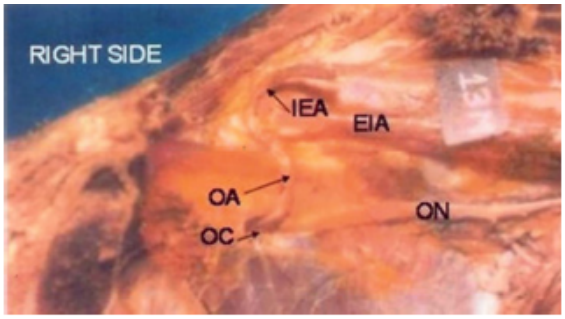

Figure 2: Showing origin of right obturator artery (OA) from the inferior epigastric artery(IEA) (EIA-External iliac artery, ON-Obturator nerve, IIA-internal iliac artery, OC- obturator canal).

inferior gluteal artery. In another (1.67%), there was a common trunk of origin for obturator, inferior gluteal and internal pudendal arteries. In another case (1.67%), a common trunk of origin for obturator, internal pudendal and middle rectal arteries was observed. In 1 side (1.67%), origin was in common with superior vesical artery.

It arose from posterior trunk of internal iliac in 6 sides (10%) (Figure 2). It took origin from the internal iliac artery in 2 sides (3.33%) (Figure 3), as there was no typical division of internal iliac into anterior and posterior trunks.

Obturator artery was seen arising from inferior epigastric artery in 4 sides (6.67%) (Figure 4). It arose from external iliac in 2 sides (3.33%) (Figure 5). In 4 sides (6.67%), there was double origin of obturator artery from internal and external iliac arteries.

In 4 sides (6.67%), obturator nerve was found lying below the artery (Figure 6). Length of the artery taking origin from anterior trunk varied between 40-88 mm whereas artery from posterior trunk had length ranging from 70-115 mm. The arteries from external iliac or inferior epigastric were 30- 40 mm long

Discussion

The obturator artery normally arises from anterior trunk of internal iliac artery in the pelvis having obturator nerve above and obturator vein below [3-5,7]. In the present study, it was observed to have the described origin in 70%, while Braithwaite found it in 41.4%. Pick et al. [8] studied obturator artery in Americans (640 pelvic halves). He found it to arise from Internal iliac and its two divisions in 47.5%, but didn't describe how much from anterior and posterior trunks [9].

In the present study, in 6 sides, it was found arising from the anterior trunk, but in common with some other branches of the anterior trunk. In 2 sides (3.33%), it arose in common with vaginal and internal pudendal artery. In 1 side (1.67%), origin was as a common trunk with inferior gluteal artery. In another (1.67%), there was a common trunk of origin for obturator, inferior gluteal and internal pudendal arteries. In another case (1.67%), a common trunk of origin for obturator, internal pudendal and middle rectal arteries was observed. In one side (1.67%), origin was in common with superior vesical artery. Braithwaite

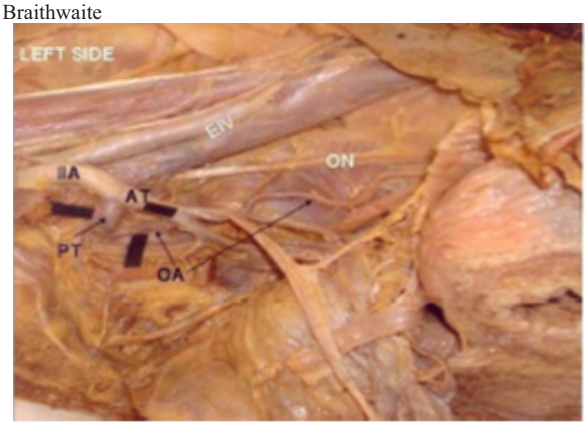

Figure 3: Showing origin of left obturator artery (OA) from posterior trunk (PT) of the internal iliac artery (IIA) (.ON-Obturator nerve, EIV- xternal iliac vessels, AT- anterior trunk).

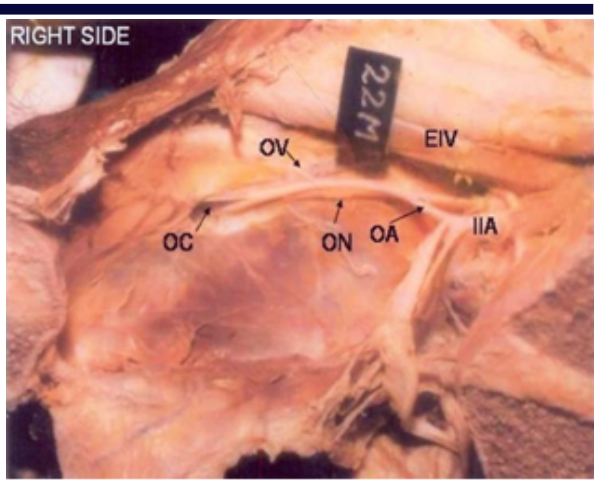

Figure 4: Showing origin of right obturator artery(OA) from the internal iliac artery(IIA), with obturator nerve (ON) lying very close and just below the artery OV- obturator vein, EIV-External iliac vessels, OC-obturator canal).

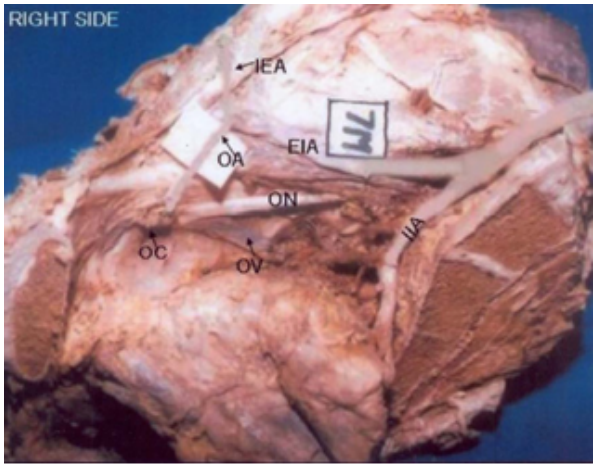

Figure 5: Showing origin of right obturator artery (OA) from the External iliac artery(EIA) (OV- Obturator vein, ON- Obturator nerve, IIA- Internal iliac artery, IEA-Inferior epigastric artery.

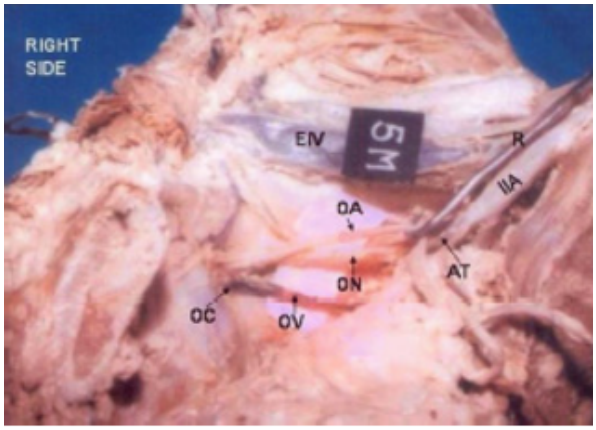

Figure 6: Showing the right obturator artery(OA) arising from the anterior trunk(AT) of the internal iliac artery(IIA) with obturator nerve(ON) lying below the artery(EIV-external iliac vessels, OC- obturator canal, R-retractor).

observed origin of obturator artery in common with Inferior gluteal-internal pudendal trunk in 10%, with Inferior gluteal artery in 4.7%, with Internal pudendal artery in 3.8%. Pick et al. [8] found it to arise in common with Inferior gluteal in 8.7%, with internal pudendal in 2.8% [9].

In the present study, origin of obturator artery was variable in 30%. It arose from the posterior trunk of internal iliac artery in 10% of cases, while Roberts and Krishingner found it to arise from Posterior trunk of internal iliac in 16.45% cases [10].

Parson and Keith [11] found it to arise from internal iliac in 16.4% while, Roberts and Krishingner [10] observed it in 3.79% cases. In the present study, it was found to arise from internal iliac in 3.33% cases.
It was observed by previous authors to arise from inferior epigastric in 25.31%, 7.14%, 44% [10,12,13], while in the present study, it arose from inferior epigastric in 6.67%. According to Anson, one may expect to find an obturator artery from epigastric or external iliac origin in approximately 48 percent of individuals. Obturator artery when arises from the inferior epigastric artery, its proximal relationships are altered. It usually passes on the lateral side of the femoral ring i.e adjacent to external iliac vein [7].

In few cases, it was found to arise from external iliac like in 1.26% cases reported by Roberts and Krishingner [10] 1.1% by Braithwaite [8], while in the present study, it was observed to arise from external iliac in 3.33% cases. According to Hollinshead in about 13-30%, the obturator artery has an anomalous origin, the origin may be either from external iliac or inferior epigastric, and the vessel then passes almost directly to reach the obturator foramen. Sometimes the posterior trunk also gives rise to obturator artery [3]. Obturator artery when arising from inferior epigastric artery present in relation to femoral ring may lead to heamorrhage during repair of femoral hernia in 28% cases [14]. When it lies at the medial side of the ring, alongside the edge of the lacunar ligament, it is vulnerable to injury or division if the ligament has to be incised to release a strangulated femoral hernia [5].

Braithwaite [8] observed dual origin of obturator artery from external and internal iliac in 6.5% cases, while in the present study, it was found in 6.67% cases.

In the present study in 6.67% cases, obturator nerve was found lying below the artery. Pick et al. [9] noticed such exceptional arrangement in which the artery was lying anterosuperior to the nerve or actually formed a ring around it.

The knowledge of the relations of the obturator artery is of interest to a surgeon employing the technique of intrapelvic extraperitoneal resection of the obturator nerve in the treatment of spastic paralysis. Unexpected heamorrhage will occur if the artery- closely related to the nerve- is cut [2].

Length of the arteries arising from anterior trunk varied from 40- 88 mm. It cannot be compared, because of dearth of literature. Length of the arteries from posterior trunk was ranging from 70-115 mm. An author observed the length of an obturator artery arising from posterior trunk to be 71 mm [15].

The variation of origin of obturator artery can be because it is comparatively late in development from a plexus which in turn is joined by the axial artery of lower limb that accompanies the sciatic nerve [16]. It is currently accepted that the anomalies affecting the arterial patterns of the limbs are based on the unusual selection of channels from primary capillaries. The most appropriate channel enlarges, whilst the others retract and disappear, thereby establishing the final arterial pattern and resulting in variations in the origin [17].

Conclusion

The superior border of the iliopubic ramus is an area of considerable concern for a variety of surgical subspecialists, as it sub serves as an anchoring site for inguinal and femoral hernia repairs. Surgeons operating on the lower abdomen and pelvis often retract the abdominal muscles laterally placing pressure on the lateral pelvic walls. Thus, a complete understanding of anatomy of this area is critical.
The relevance of this paper is to draw attention of those engaged in interventional maneuver into human pelvis, as a variant obturator vessel can be inadvertently cut results in very serious complication

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